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Species of *Rhytismataceae* on *Camellia* spp. from the Chinese mainland

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Abstract—Six species in five different genera of the *Rhytismataceae* are reported from *Camellia* spp. on the Chinese mainland. Among them *Lophodermium sinense* on *Camellia sinensis* is described as a new species, and *Terriera camelliae* on *C. octopetala* is a new combination, while *Bifusella camelliae*, *Coccomyces sinensis*, *Hypohelion durum*, and *Lophodermium jiangnanense* are already known for China. This paper provides descriptions and a key for all these species as well as illustrations for the new species. All examined specimens are deposited in the Reference Collection of Forest Fungi of Anhui Agricultural University, China (AAUF).

Key words—*Rhytismatales,* taxonomy, plant pathogens, *Theaceae*

Introduction

Members of *Camellia* L. (*Theaceae*) are evergreen shrubs or trees, with a total of 280 species distributed in bilateral zones of the Tropic of Cancer in east Asia, including 238 species in southwestern and south China (Zhang & Ren 1998). Camellias are economically valuable as ornamentals and sources of beverages, tea oil, and medicine.

Of the 1072 fungal species known to inhabit *Camellia* worldwide, only 10 belong in the *Rhytismataceae* (Farr & Rossman 2011). *Cryptomyces theae* Sawada, the first rhytismataceous species recorded on *C. sinensis* (L.) Kuntze, was described from Taiwan by Sawada (1919) and later found on the same host in Japan (Hara 1936). Minter (1982) reported *Lophodermium camelliicola* Minter on *C. sinensis* from India. Kobayashi (2007) recorded *L. hysterioides*

(Pers.) Sacc. (= *L. foliicola* (Fr.) P.F. Cannon & Minter) and two *Coccomyces* species on *C. japonica* L. in Japan. Up to now, five species of *Rhytismataceae* have been described on *Camellia* from mainland China (Teng 1933; Hou 2000; Lin et al. 2001a, 2004a,b). These fungi are mostly plant pathogens leading to different degrees of economic loss. *Lophodermium jiangnanense* can cause a leaf cast of *C. oleifera* C. Abel (Lin et al. 2004a), while *Bifusella camelliae* and *Hypohelion durum* on *C. sinensis* can cause serious branch rot (Hou 2000, Lin et al. 2004b). The present study, based on specimens collected by the authors, reports one hitherto undescribed species, makes one new combination, and discusses the four other species known on *Camellia* from the Chinese mainland. These records may not be complete, as more rhytismataceous species on camellias can be expected in this region.

Materials & methods

Macroscopic appearance was described from observations made under the dissecting microscope at 10–50 × magnification. Reference collection material was rehydrated in water for 15 min, and 10–15 µm thick sections of the fruit bodies were cut using a freezing microtome. For the observations of outlines of ascomata and conidiomata in vertical section, sections were mounted in lactic acid or cotton blue with pretreatment in water. The color of the various structures and of ascospore contents was observed in water. Gelatinous sheaths surrounding ascospores and paraphyses were examined in water or 0.1% (w/v) cotton blue in lactic acid. Measurements were made using material mounted in 5% KOH or Melzer's reagent and from 30 asci, ascospores, and paraphyses for each specimen. Line and point integrated illustrations of external shapes and internal structures of fruit bodies were drawn using a microscopic drawing tube (Panasonic XSJ-2, Japan).

Taxonomy

Bifusella camelliae C.L. Hou, Mycosystema 19: 7, 2000.

Type: **China**, **Anhui**, Yuexi, Wen'ao, alt. ca 1100 m, on *Camellia sinensis*, 10 May 1992, C.L. Hou 0210 (AAUF 90085).

Illustration: Hou 2000: 8, Fig. 1.

Zone lines brown to black-brown, infrequent, thin or slightly broad, sometimes not closed.

Conidiomata on twigs, scattered. In surface view conidiomata 90–190 × 100–170 µm, circular to elliptical, black-brown in the centre and at the edge of the conidioma, brown elsewhere, flattened or slightly raising the substratum surface, opening by one apical ostiole. In vertical section subcuticular. Conidia 4–6 × ca 1.2 µm, cylindrical, hyaline, aseptate.

Ascomata scattered in similar positions on the host. In surface view ascomata 500–1260 × 230–420 µm, elliptical, shinning black, edge defined, slightly raising the substratum surface, opening by a somewhat irregular

longitudinal split nearly extending to the edge of ascoma. Lips absent. In median vertical section ascomata subcuticular. Covering stroma 20–30 µm thick near the opening, gradually thinner towards the edge, connecting to the basal stroma, composed of black-brown textura globulosa-angularis with cells of 3–5 µm diam. Basal stroma 5–7 µm thick, composed of dark brown, thick-walled globular and angular cells 3–5 µm diam. Subhymenium 10–15 µm thick, consisting of hyaline textura intricata. Paraphyses slightly exceeding the asci, 1.5–2 µm wide, filiform, septate, sometimes swollen to 3–5 µm at the apex, covered with a thin mucous coating. Asci ripening sequentially, 70–100 × 12.5–14 µm, clavate, short-stalked, nearly truncate-conical to obtuse at the apex, J–, 8-spored. Ascospores biseriate or multiseriate, 19–25 × 2.5–4 µm, bifusiform, isthmus ca 1 µm wide, hyaline, aseptate, with a 0.8–2 µm thick gelatinous sheath.

Host species, habitat, and distribution: *Camellia sinensis*; producing conidiomata and ascomata in lesions on decaying and dying twigs. Known only from Anhui Province, China.

Specimens examined: On *Camellia sinensis*: **China**, **Anhui** Mt Guniujiang, alt. ca 1600 m, 2 July 2006, Y.R. Lin, S.J. Wang 2104 (AAUF 68212); Mt Tiantangzhai, alt. ca 1200 m, 23 June 2009, J.L. Chen, X.M. Gao 5294 (AAUF 71402).

Comments—*Bifusella tsugae* H.S. Cao & C.L. Hou, closely related to *B. camelliae,* differs in having ascospores with a wider isthmus, paraphyses not swollen at the apex, absence of zone lines, and occurrence on needles of *Tsuga chinensis* (Franch.) E. Pritz. (Cao et al. 1996, as *T. tchekiangensis*).

Bifusella camelliae can cause a serious branch rot of the tea plant in regions where the specimens were collected, the damage of branch tips exceeding 85% in the tea garden where the disease occurs. It may therefore pose a threat to the tea-growing industry. According to our observations, this fungus infects new twigs, gradually causing brown to grey-yellow lesions where conidiomata and ascomata are successively produced. Between May and June of the second year, ascomata mature to discharge ascospores, leading to the next infection.

Coccomyces sinensis Y.R. Lin & Z.Z. Li, Mycosystema 20: 3, 2001.

Type: **China**, **Hunan**, Changsha, Yuelushan, alt. ca 300 m, on *Camellia oleifera*, 24 June 1990, Y.R. Lin et al. 0521b (AAUF 66629b).

Illustration: Lin et al. 2001a: 4, Fig. 2.

Zone lines grey-black, thin, entirely or partly surrounding the bleached spots.

Conidiomata not observed.

Ascomata on both sides of leaves, mostly on the lower side, crowded, in subcircular bleached spots. In surface view ascomata 600–1150 µm diam., triangular to pentagonal, black-brown to black, raising the substratum surface but depressed in the central region, opening by radial splits to expose a light

orange-yellow hymenium. Lips absent. In median vertical section ascomata intraepidermal. Covering stroma 25–32 µm thick near the opening, slightly thinner towards the edge, extending to the basal stroma, black-brown, composed of 3–6 µm diam., thick-walled angular cells. Periphysoids absent. Basal stroma 12–18 µm thick, composed of dark brown textura angularis with thick-walled cells 5–8 µm diam. Excipulum arising from the inner cells of the covering stroma, 25–30 µm wide above, consisting of several rows of 2–3 µm diam., multi-septate hyphae. Internal matrix stroma 20–35 µm thick, gelatinized, consisting of loose textura intricata. Subhymenium 10–15 µm thick, composed of textura porrecta-intricata. Paraphyses filiform, 2–2.5 µm wide below, abruptly enlarged to 4–6.5 µm and subfusoid-ventricose above, with a subcylindrical, ca 1.5 µm wide pointed apex, capped with a mass of yellow-brown, subcylindrical gel 8–15 × 6–8 µm, forming a solid refractive epithecium 18–25 µm thick. Asci ripening sequentially, 110–130 × 5.5–6.5 µm, cylindrical, short-stalked, rounded at the apex, with circumapical thickening, J–, 8-spored. Ascospores fasciculate, 60–95 × 1–1.2 µm, filiform, hyaline, aseptate, covered by an inconspicuous gelatinous sheath.

Host species, habitat, and distribution: *Camellia* cf. *japonica* (Kirschner et al. 2009), *C. chekiangoleosa* Hu, *C. oleifera*; producing ascomata on dead leaves. Known from southern China and Taiwan (Kirschner et al. 2009).

Specimens examined: On *Camellia chekiangoleosa*: **China**, **Zhejiang**, Hangzhou, Liuxia, alt. ca 60 m, 6 August 1990, Y.R. Lin 0727 (AAUF 66835).

On *C. oleifera*: **China**, **Anhui**, Huangshan Arboretum, alt. ca 550 m, 5 Sep. 2009, J.L. Chen, S.J. Wang 5317 (AAUF 71425); **Fujian**, Fuzhou Arboretum, alt. ca 320 m, 2 July 1990, Y.R. Lin 0644 (AAUF 66752); **Guangdong**, Guangzhou, South China Botanical Garden, alt. ca 382 m, 22 June 1990, Y.R. Lin 0515 (AAUF 66623); **Jiangxi**, Nanchang People Park, alt. ca 25 m, 28 June 1990, Y.R. Lin 0587 (AAUF 66695).

Comments—*Coccomyces sinensis* is common on camellias in southern China and was also found recently on fallen leaves of *Camellia* cf. *japonica* in Taiwan (Kirschner et al. 2009). It is very similar in the shape of its paraphyses (subfusoid-ventricose and pointed apices) to *C. mucronatus* Korf & W.Y. Zhuang on *Fagaceae,* which differs in polygonal to subcircular ascomata, much narrower asci (4.3–5 µm) and ascospores (0.6–0.8 µm), dense periphysoids, and paraphyses lacking refractive solid gel at the apex (Korf & Zhuang 1985). *Coccomyces urceoloides* Spooner, which also somewhat resembles *C. sinensis* in paraphyses capped with a mass of subhyaline or yellowish solid gel and measuring 6–12 × 5–8 µm, differs in other aspects (Spooner 1990).

Hypohelion durum Y.R. Lin, C.L. Hou & S.J. Wang, Mycosystema 23: 169, 2004.

Type: **China**, **Anhui**, Yuexi, Wen'ao, alt. ca 1100 m, on *Camellia sinensis*, 27 May 1994, C.L. Hou 0014 (AAUF 66122).

Illustration: Lin et al. 2004b: 170, Fig. 1.

Zone lines brown to dark brown, infrequent, narrow to broad, somewhat diffused.

Conidiomata on twigs, usually crowded. In surface view conidiomata 90–230 μm diam., subcircular, black-brown in the centre and at the perimeter line, brown elsewhere, somewhat raising the substratum surface. In vertical section subcuticular. Upper wall 3–5.5 μm thick, dark brown, consisting of small angular cells. Basal wall 5–7 μm thick, black-brown. Conidiogenous cells 7.5–12 × 2–2.5 μm, flask-shape. Conidia 4.5–6.5 × 0.8–1 μm, cylindrical, hyaline, aseptate.

Ascomata in similar positions to conidiomata on the substratum, scattered to crowded in yellow-brown to grayish-white lesions. In surface view ascomata 450–950 × 260–400 μm, elliptical or broad-elliptical, black, with a clear outline, slightly raising the substratum surface, opening by a longitudinal split. Lips absent. In median vertical section ascomata subcuticular. Covering stroma 20–28 μm thick near the opening, slightly thinner towards the edge and extending to the basal stroma, composed of textura angularis-epidermoidea with black-brown or brown, thick-walled cells 4–6 μm diam. Basal stroma 12–18 μm thick, composed of 4.5–7 μm diam., black-brown, thick-walled angular and elongate cells. The triangular space between the covering and basal stroma is filled with grey-brown rather thin-walled, large angular cells. Subhymenium 18–25 μm thick, consisting of textura porrecta. Paraphyses 110–135 × 1.5–2 μm, filiform, swollen to 2.5–3.5 μm above, surrounded by a ca 1.5 μm thick gelatinous matrix. Asci ripening sequentially, 75–115 × 13–16 μm, clavate, somewhat long-stalked, apex rounded to subtruncate, J–, 8-spored. Ascospores more or less biseriate, 18–25 × 3–4 μm, cylindrical to subclavate, hyaline, aseptate, with a conspicuous gelatinous sheath 4–6 μm thick.

Host species, habitat, and distribution: *Camellia sinensis*; producing conidiomata and ascomata in lesions on decaying and dying twigs. Common in southern China.

Specimens examined: On *Camellia sinensis*: **China**, **Anhui**, Huangshan Arboretum, alt. ca 550 m, 20 Oct. 2001, Y.R. Lin et al. 1785 (AAUF 67893); Huangshan Arboretum, alt. ca 550m, 5 Sep. 2009, J.L. Chen, S.J. Wang 5322 (AAUF 71430); **Jiangsu**, Nanjing, alt. ca 90 m, 10 April 1973, D.J. Lu 1308 (AAUF 67416).

Comments— *Hypohelion durum* is rather distinctive. It is consistent with typical features of the genus except for the presence of basal stroma and yet is far from genera such as *Hypoderma* De Not. *Hypohelion scirpinum* (DC.) P.R. Johnst. is similar but differs by its much larger ascomata (800–3000(–7000) × 500–800 μm) and ascospores with a median septum (40–75 × 4.5–6.5 μm), the absence of dark basal stroma, and its occurrence in marshes on *Scirpus* spp. (Johnston 1990). A strong parasite that is common on tea plants in southern China, *H. durum* can cause different degrees of branch rot (Lin et al. 2004b).

Lophodermium jiangnanense Y.R. Lin & S.J. Wang, Mycosystema, 23: 15, 2004.

Type: **China**, **Hunan**, Changsha, Yuelushan, alt. ca 300 m, on *C. oleifera*, 24 June 1990, Y.R. Lin 0521a (AAUF 66629a).

Illustration: Lin et al. 2004a: 16, Fig. 2.

Zone lines absent.

Conidiomata mostly hypophyllous, usually crowded. In surface view conidiomata 130–220 μm diam., subcircular, black-brown in the centre and at the perimeter line, brown elsewhere. In vertical section subepidermal. Conidia not observed.

Ascomata on both sides of leaves, predominantly on the lower side, crowded in grey-yellow, circular to irregular, bleached spots. In surface view ascomata 600–990 × 280–360 μm, elliptical or occasionally 3-lobed, black, slightly shiny, edge defined, raising the substratum surface, opening by a longitudinal split which is sometimes branched. Lips absent. In median vertical section ascomata subepidermal. Covering stroma 18–30 μm thick, extending to the basal stroma, composed of grey-brown, thick-walled, angular and elongate cells 3–3.5 μm diam., markedly black and brittle near the opening, with several rows of almost colorless, septate, cylindrical thin-walled cells occurring on the inner side of the upper margin of the covering stroma. Basal stroma 15–28 μm thick, composed of 4–7 μm diam., black-brown, thick-walled angular cells. The triangular space between the covering and basal stroma is filled with a hyaline, gelatinized reticulate tissue. Subhymenium 15–20 μm thick, consisting of textura porrecta. Paraphyses ca 1.5 μm wide, filiform, septate, often gradually swollen to 2–2.5 μm, twisted and intertwined above to form a yellow epithecium 10–15 μm thick. Asci ripening sequentially, 95–130 × 6–7.5 μm, cylindrical, rounded at the apex, J–, 8-spored. Ascospores fasciculate, 60–90 × 1.4–1.6 μm, filiform, hyaline, aseptate, with a 0.8–1 μm thick gelatinous sheath.

Host species, habitat, and distribution: *Camellia oleifera*; forming conidiomata and ascomata on dead part of living leaves or on fallen leaves. Known from Hunan, Anhui, and Guangdong Provinces, China.

Specimens examined: On *Camellia oleifera*: **China**, **Anhui** Guichi, Forest Nursery of Guichi, alt. ca 600 m, 11 Oct. 1992, Q.S. Liu, Q. Cao 1640 (AAUF 67748); Huangshan, Renzipu, alt. ca 660 m, 6 Sept. 2009, J.L. Chen, Y.R. Lin 5345 (AAUF 71453); **Guangdong**, Guangzhou, South China Botanical Garden, alt. ca 382 m, 22 June 1990, Y.R. Lin 0515b (AAUF 66623b).

Comments—*Lophodermium jiangnanense* resembles *L. intricatum* Spooner, which differs in its association with zone lines, much larger ascomata (1000–1200 × ca 500 μm) and asci (135–152 × 7–7.5μm) with truncate-conical apices, longer ascospores with a median septum, and much-branched paraphyses (Spooner 1991). This fungus usually produces fruit bodies on fallen *C. oleifera* leaves, but the collection from Anhui Province (AAUF 67748) shows that it primarily infects living leaves and develops fruit bodies in yellow-

brown to yellowish-white spots near the margin of leaves on which an obvious brown ridged zone between the healthy and sick areas has formed. It is often accompanied by *Coccomyces sinensis,* sometimes growing on the same leaves (Lin et al. 2004a).

Lophodermium sinense Y.R. Lin, C.L. Hou & Jiang L. Chen, **sp. nov.** Figs. 1–7

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Ascomata amphigena, dispersa vel aggregata, (290–)400–730 × (150–)220–290 µm, elliptica, interdum triloba, atra, labiis carentia, ab rima longitudinali vel lobis ternis aperientia, partim subcuticularia et partim intraepidermalia, cellulis epidermalibus plus quam 4 successive in stromate basali ordinatis. Paraphyses filiformes, prope apicem plerumque gradatim tumidae et semel aut iterum ramosae, necnon epithecium formantes. Asci in successione maturescentes, 80–120 × 6–7 µm, cylindrici, brevi-stipitati, J–, 8-spori. Ascosporae 50–95 × 1.2–1.5 µm, filiformes, hyalinae, aseptatae, vagina gelatinosa 1–1.5 µm crassa indutae.

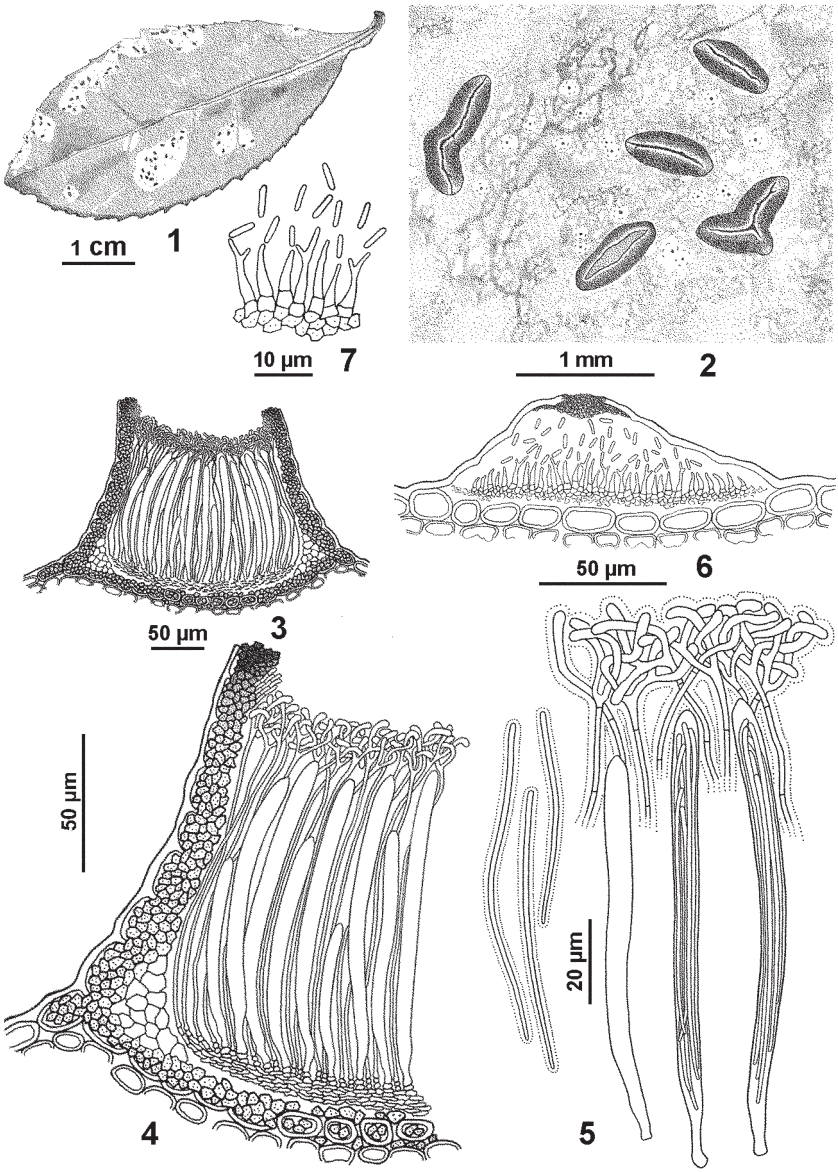
Type: China, Anhui, Mt Guniujiang, alt. ca 1600 m, on leaves of *Camellia sinensis*, 10 July 2006, Y.R. Lin, S.J. Wang 2103 (**Holotype** AAUF 68211).

Etymology: referring to the country where the specimen was collected.

Zone lines absent.

Conidiomata on both sides of leaves, scattered to crowded, occasionally merging into one another. In surface view conidiomata 80–160 µm diam., circular or subrounded, black-brown in the centre, more or less concolorous with the substratum surface elsewhere, slightly raising the leaf surface, discharging spores through a 10–15 µm diam. apical ostiole. In vertical section subcuticular. Upper wall only present around the ostiole. Basal wall absent. Subconidiogenous layer ca 7 µm thick, composed of light thin-walled angular cells. Conidiogenous cells 6–9 × 2–3 µm, cylindrical, slightly tapering towards the apex, hyaline, proliferating sympodially. Conidia 4–6 × 1 µm, cylindrical, hyaline, aseptate.

Ascomata in similar positions to conidiomata on the substratum, scattered or crowded in subcircular to irregular, yellow-brown bleached spots 5–15 mm diam. In surface view ascomata (290–)400–730 × (150–)220–290 µm, elliptical, sometimes curved or 3-lobed, with a clear outline, ends rounded or obtuse, matt black except for a grey-brown area at each end, strongly raising the substratum surface, opening by a longitudinal split more than 4/5 the length of the ascoma, which is sometimes branched, to expose a light yellow-brown hymenium. Lips absent. In median vertical section ascomata subcuticular near the opening and intraepidermal in the lower part of the covering stroma, more than four epidermal cells being displaced and lying always successively on the basal stroma. Covering stroma 12–20 µm thick, black-brown, connecting to the basal stroma, composed of textura angularis-globulosa with thick-walled cells 2–5 µm diam., markedly black and brittle near the opening, with



Figs. 1–7. *Lophodermium sinense* on *Camellia sinensis*. 1. A leaf bearing fruit bodies. 2. Ascomata and conidiomata observed under a dissecting microscope. 3. Ascoma in median vertical section. 4. Detail of ascoma in median vertical section. 5. Paraphyses, asci and ascospores. 6. Conidioma in vertical section. 7. Conidiogenous cells and conidia.

4–5 rows of light thin-walled cells occurring on the inner side of the upper margin of the covering stroma. Basal stroma slightly concave or nearly flat, 10–18 µm thick, black-brown, composed of 2–3 layers of thick-walled angular cells 2.5–5.5 µm diam. The triangular space between the covering and basal stroma filled is with 5–8 µm diam., light grey-brown, slightly thick-walled angular cells. Subhymenium 10–18 µm thick, consisting of textura angularis-porrecta. Paraphyses 1–1.5 µm wide, filiform, hyaline, septate, covered in a thin mucous coating 1.5–2 µm thick, often gradually swollen to 2–3 µm and 1–2 times branched near the apex, contorted and intertwined to above form a conspicuous epithecium 12–24 µm thick. Asci ripening sequentially, 80–20 × 6–7 µm, cylindrical, short-stalked, apex rounded, thin-walled, without circumapical thickening, J–, 8-spored. Ascospores arranged fasciculately or somewhat helically, 55–95 × 1.2–1.5 µm, filiform, slightly tapering towards the base, hyaline, aseptate, with a 1–1.5 µm thick gelatinous sheath.

Host species, habitat, and distribution: *Camellia sinensis*; ascomata develop on living leaves but are seen in a mature condition only on fallen leaves. Known only from the type locality, Anhui, China.

Comments—*Lophodermium sinense* is very similar to *L. jiangnanense* on the same plant genus, but the latter has larger subepidermal ascomata and conidiomata, unbranched paraphyses, a covering stroma comprising aliform and elongate cells, and a well developed basal stroma with hyaline reticulate tissue in the corner between the covering and basal stroma (Lin et al. 2004a). *Lophodermium intricatum* is also similar to the new species but differs in its much larger ascomata, asci, and ascospores, asci with truncate-conical apices, ascospores with a median septum and without a gelatinous sheath, and the presence of zone lines (Spooner 1991). *Lophodermium implicatum* Y.R. Lin & Z.S. Xu differs in possessing intraepidermal ascomata associated with dark brown zone lines, shorter ascospores, and intraepidermal conidiomata with trichogynes (Lin et al. 2001b).

Lophodermium sinense is a pathogen causing leaf spot. The fungus at first probably develops within the living leaves but visible symptoms do not show, after which the anamorphic and teleomorphic fruit bodies sequentially appear on brown lesions of infected leaves as the vitality of the host declines. Diseased leaves become reddish-brown and fall between July and August. Mature ascomata have been observed only on fallen leaves.

Terriera camelliae (Teng) Y.R. Lin & Jiang L. Chen, **comb. nov.**

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≡ *Lophodermium camelliae* Teng, Sinensia 4: 138, 1933

≡ *Clithris camelliae* (Teng) Tehon, Mycologia 31: 675, 1939

≡ *Colpoma camelliae* (Teng) Teng, Fungi of China: 759, 1963

Type: **China**, **Fujian**, Fuzhou, on fallen leaves of *Camellia* sp., Teng 1904 (No.77 in the Metropolitan Museum, Academia Sinica, Nanking, China).

Illustration: Tehon 1939: 682, Fig. 6.

Zone lines grey-brown, infrequent, thin, entirely or partly surrounding the bleached spots.

Conidiomata amphigenous, crowded. In surface view conidiomata 70-130 µm diam., subcircular to irregular, flattened, black-brown in the centre and at the perimeter line of the conidioma, grey-brown elsewhere. In vertical section intraepidermal to subepidermal. Upper wall only present around the ostiole. Basal wall 8–12 µm thick, composed of brown to dark brown tissue with no obvious structure. Conidia 2.5–4 × ca 0.8 µm, cylindrical, hyaline, aseptate.

Ascomata in similar positions to conidiomata on the substratum, scattered to crowded in grey-yellow, subcircular to irregular bleached spots. In surface view ascomata 440–870(–1020) × 290–490 µm, elliptical or occasionally 3-lobed, black-brown to black, slightly shiny, edge defined, moderately raising the substratum surface, opening by a longitudinal split about 4/5-7/8 the length of the ascoma, which is sometimes branched. Lips absent. In median vertical section ascomata subepidermal. Covering stroma 15–22 µm thick near the opening, slightly thinner towards the edge, extending to the basal stroma, composed of black-brown, thick-walled angular cells 3–5 µm diam. Along the edge of the ascomatal opening is a 10–15 µm thick, flattened extension to the covering stroma which covers the hymenium, and which comprises markedly black and brittle carbonized tissue with no obvious cellular structure. Basal stroma composed of 1–2 layers of black-brown, thick-walled, angular to globular cells. Subhymenium 12–18 µm thick, consisting of textura porrecta. Paraphyses extending 15–30 µm beyond the asci, ca 2 µm wide, filiform, sometimes gradually swollen to 2.5–3 µm or branched above, septate. Asci ripening sequentially, 85–120 × 5.5–6.5 µm, cylindrical, short-stalked, rounded at the apex, J–, 8-spored. Ascospores arranged fasciculately or somewhat helically, 52–80 × 1–1.2 µm, filiform, hyaline, aseptate, covered by a ca 0.5 µm thick gelatinous sheath.

Host species, habitat, and distribution: *Camellia octopetala* Hu, *Camellia* sp. (Teng 1933); conidiomata and ascomata were found on fallen leaves. Known only from Fujian Province, China.

Specimens examined: On *Camellia octopetala*: **CHINA**, **Fujian**, Fuzhou Arboretum, alt. ca 320 m, 2 July 1990, Y.R. Lin 0643 (AAUF 66751); 11 June 2009, J.L. Chen, L. Chen 5108 (AAUF 71216).

Comments—Taxonomic placement of *Terrea camelliae* has long been controversial. Teng (1933) originally validly published the fungus as *L. camelliae*. Tehon (1939), who examined part of the type (labeled "co-type" by Teng), felt that it lacked structures characteristic of the *Hypodermataceae*

(= *Rhytismataceae*) and transferred it to *Clithris* (Fr.) Bonord. (= *Cenangium* Fr.) in the *Helotiaceae* Rehm (Kirk et al. 2008). Teng's later (1963) transfer of the taxon to *Colpoma* Wallr. cannot be accepted because *Colpoma* ascomata develop on bark (not leaves) and have a well-developed basal stroma.

Eriksson (1970) erected the new genus *Terriera* B. Erikss. based on the type species *T. cladophila* (Lév.) B. Erikss. on *Vaccinium myrtillus* L. Johnston (2001) and Ortiz-García et al. (2003) transferred several species to *Terriera*, including *Clithris arundinacea* Penz. & Sacc., *C. minor* Tehon, *Lophodermium fuegianum* Speg., *L. javanicum* Penz. & Sacc., and *L. sacchari* Lyon. *Terriera* differs from *Lophodermium* Chevall. by the markedly black and brittle extensions of the covering stroma and by the thin-walled, prismatic or angular cells in the corner between the covering and basal stroma. The present species on *Camellia* sp. and *C. octopetala* fits closely the characters of *Terriera* based on the illustration by Tehon (1939) and examinations carried out by the authors. Consequently, we redispose it as *T. camelliae*.

There are some signs that *T. camelliae* may be a pathogen associated with leaf cast of eight-petaled *Camellia* species.

Key to species of *Rhytismataceae* on *Camellia* from the Chinese mainland

1a. Ascomata on twigs **2**
1b. Ascomata on leaves **3**
2a. Ascospores bifusiform . . . . . ***Bifusella camelliae***
2b. Ascospores cylindrical, elliptical or subclavate . . . . . ***Hypohelion durum***
3a. Ascomata triangular to pentagonal, opening by radial splits . . ***Coccomyces sinensis***
3b. Ascomata elliptical, opening by a longitudinal split **4**
4a. Ascomata partly subcuticular and partly intraepidermal ***Lophodermium sinense***
4b. Ascomata subepidermal **5**
5a. Covering stroma with a markedly black brittle flattened extension covering the hymenium . . . . . ***Terriera camelliae***
5b. Covering stroma without such an extension . . . . . ***Lophodermium jiangnanense***

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